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07/852,517 03/17/92 YAMAZAKI

S 0756-711

EXAMINER

SAADAT, M

SIXBEY, FRIEDMAN, LEEDOM & FERGUSON 25M3
2010 CORPORATE RIDGE, STE. 600
MCLEAN, VA 22102

ART UNIT

PAPER NUMBER

2508

7

DATE MAILED:

03/15/93

This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

☒ This application has been examined ☐ Responsive to communication filed on _____ ☐ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), _____ days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

- | | |
|---|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited by Examiner, PTO-892. | 2. <input type="checkbox"/> Notice re Patent Drawing, PTO-948. |
| 3. <input type="checkbox"/> Notice of Art Cited by Applicant, PTO-1449. | 4. <input type="checkbox"/> Notice of Informal Patent Application, Form PTO-152. |
| 5. <input type="checkbox"/> Information on How to Effect Drawing Changes, PTO-1474. | 6. <input type="checkbox"/> _____ |

Part II SUMMARY OF ACTION

1. ☒ Claims 1-20 are pending in the application.

Of the above, claims 5-14 are withdrawn from consideration.

2. ☐ Claims _____ have been cancelled.
3. ☐ Claims _____ are allowed.
4. ☒ Claims 1-4, 15-20 are rejected.
5. ☐ Claims _____ are objected to.
6. ☐ Claims _____ are subject to restriction or election requirement.
7. ☐ This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.
8. ☐ Formal drawings are required in response to this Office action.
9. ☐ The corrected or substitute drawings have been received on _____. Under 37 C.F.R. 1.84 these drawings are ☐ acceptable ☐ not acceptable (see explanation or Notice re Patent Drawing, PTO-948).
10. ☐ The proposed additional or substitute sheet(s) of drawings, filed on _____ has (have) been ☐ approved by the examiner. ☐ disapproved by the examiner (see explanation).
11. ☐ The proposed drawing correction, filed on _____, has been ☐ approved. ☐ disapproved (see explanation).
12. ☐ Acknowledgment is made of the claim for priority under U.S.C. 119. The certified copy has ☐ been received ☐ not been received
☐ been filed in parent application, serial no. _____; filed on _____
13. ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.
14. ☐ Other

EXAMINER'S ACTION

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Claims 4 and 18-20 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claims 4 and 20, the alternative form in "excimer or YAG laser" makes the claim indefinite. In claim 18, the limitation of the semiconductor being "intrinsic or substantially intrinsic" is indefinite.

The following is a quotation of 35 U.S.C. § 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Claims 1-4 and 15-20 are rejected under 35 U.S.C. § 103 as being unpatentable over Pankove (U.S. Patent No. 4,803,528) in view of Wolf et al (Silicon Processing for the VLSI Era). The semiconductor device as disclosed by Pankove is formed in an oxygenated single crystal silicon film deposited over a

substrate. The film is initially made of polycrystalline material which becomes single crystal upon irradiation or application of laser. Pankove is silent on the other impurities in the silicon such as carbon or nitrogen.

Wolf et al teach method for measuring oxygen and carbon concentration in silicon indicating that such impurities are common in single crystal silicon and providing the limits for the indicated measurements methods for oxygen, carbon, and nitrogen. See Wolf et al at pages 19-21. Such limits indicate that concentrations in the specified range are commonly measured in the art.

It would have been obvious to one having ordinary skill in the art to combine the teachings of Pankove with those of Wolf et al since forming recrystallized silicon films using irradiation or laser can result in impurities of the kind and concentration as indicated in the cited references.

Absent any particular teachings to show how such impurities with a specified concentration may be achieved, a natural doping of the silicon is considered that allows such common impurities exist in the single crystal film. The limitations of Raman spectroscopy of the film cannot be given weight since they are results of activities that are performed after the structure is formed. Claim 3 includes process limitations that do not make affect the final structure of the claimed device because the

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additional thermal treatment only enhances the crystalline features of the film.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mahshid Saadat whose telephone number is (703) 308-4915.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956.

mjs

MDS
March 05, 1993

R. G. Hille
ROLF HILLE
SUPERVISORY PATENT EXAMINER
ART UNIT 2508